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# A MATTER OF DEVELOPMENT: HOW TO REDUCE VULNERABILITY IN THE FACE OF NATURAL DISASTERS

This document was prepared by ECLAC and the IDB for the "Confronting Natural Disasters: A Matter of Development" Seminar to be held in New Orleans on 25 and 26 March 2000. It was drafted by Rómulo Caballeros and Ricardo Zapata Martí —Director and official of the Subregional Headquarters of ECLAC in Mexico— and, on behalf of IDB, Edmundo Jarquín and Janine Perfit —Chief and Official of the State and Civil Society Unit of the Department of Sustainable Development— and Sergio Mora, Officer at the Bank's Representation in the Dominican Republic. The statements contained in this document do not compromise or represent the official positions of the member countries of the aforementioned institutions. The Seminar and the preparation of this document were sponsored by the Governments of Finland and Sweden.

# CONTENTS

## SUMMARY

1. Disasters are clearly a development problem. First, because certain natural phenomena, including those of a hydrometeorological, geoseismic and vulcanological origin tend to have greater effects on developing countries than on developed countries. Second, because several factors associated with a low level of development, as will be seen below, exacerbate such effects. Third, because the impact of natural phenomena on the prospects for long-term development is considerably greater in less developed countries. [1]

2. While the effects of natural disasters are a development problem, confronting them in a systematic and coherent fashion —in their causes, and in prevention, mitigation, reconstruction and transformation to reduce vulnerability— must be an explicit objective of development strategies. It was no coincidence that 95% of the deaths due to natural disasters in 1998 were in developing countries, nor that, for some of these countries, certain natural phenomena had a devastating on their populations, welfare and development prospects, while in developed countries the effects on economic activity and population are marginal.

3. The term vulnerability has taken on increased importance and finds itself on the international agenda again due to the ever greater magnitude of disasters. In general terms, it may be defined as the probability of a community, exposed to a natural hazard, given the degree of fragility of its elements (infrastructure, housing, productive activities, degree of organization, warning systems, political and institutional development), suffering human and material damages. The magnitude of such damages is, in turn, related to the degree of vulnerability.

4. Latin America and the Caribbean region are highly exposed to potentially destructive natural phenomena — meteorological, seismic, vulcanological and others. Together with this high degree of exposure to potentially destructive natural phenomena, the region's great vulnerability —social, economic, physical, environmental and political and institutional— means that it is affected by a high and growing number of natural disasters.

5. The reasons for the high vulnerability of Latin America and the Caribbean are varied and complex. There is no doubt that the development pattern followed by most countries, with high rates of poverty, socioeconomic exclusion and environmental damage, is a leading factor. In these countries, the poor, and among these, women, children and ethnic minorities, are the most fragile and vulnerable population groups. The poor live in the greatest risk areas, use environmentally damaging farming techniques or work marginal land, have less access to information, basic services and pre and post disaster protection. This greater vulnerability of poor population groups is also related, where democratic political systems are limited or precarious, to their scarce possibilities of participation in public politics. In many ways, poverty closes and exacerbates the vicious circle of disasters.

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[1] A broader consideration of disasters as a development problem should include the repercussions that the policies followed by developed countries have had on some threats, such as climate change and the processing of radioactive waste.

6. The scale of human and economic damages caused by natural disasters in Latin America and the Caribbean is staggering by any set of measurements. Some estimates put the affected (directly and indirectly) population at 150 million. And according to the figures compiled by the Economic Commission for Latin America and the Caribbean (ECLAC), between 1972 and 1999 alone the number of dead reached 108,000 and the total of those directly affected exceeded 12 million.

7. The total damages covered by the assessments made by ECLAC between 1972 and 1999 amounts to more than 50 billion dollars. The true figure for human and material damages is much greater because ECLAC has only assessed damages when governments have asked it to, and because such assessments only cover a fraction of the disasters faced by the region.

8. In addition, assessments of damages caused by natural disasters should include their highly disturbing effects on the emotional stability of affected populations and the dislocation of large population groups, with important impacts on social and political stability. Major political and social crises have arisen from these catastrophes and as a result of the quality of the governmental response, highlighting the importance of political and institutional factors when considering this subject, both from the perspective of vulnerability prevention and reduction and that of the effects of the natural phenomena themselves.

9. There is no one given behaviour or pattern in the effects and scale of the damages caused by different disasters. Rather, the resulting pattern is determined by a combination of factors including the size of the economy and its situation before the event, the structure of production, the nature and scale of the phenomenon, the moment (time and duration) at which the disaster takes place, the degree of social organization and participation, political and institutional capacity, and the way in which the government, society and the international community face the problem. However, as a general rule, smaller and less developed countries suffer significantly greater damages.

10. The long-term impact of catastrophes may be manifested in different ways (damages in economic and social infrastructure, a change of priorities, environmental changes, external or fiscal disequilibrium, inflationary processes, negative income redistribution, changes in demographic structure, etc.). The long-term macroeconomic effects are reflected in a large number of variables and may be summarized as a downtrend in per capita income. The experience of Latin America and the Caribbean confirms the hypothesis that there is a high correlation between gross domestic product (GDP) growth and the annual number of disasters. [2] One of the most important effects of a disaster is the immediate worsening of national living standards. This effect, albeit mostly concentrated in the directly affected population living in the area where the disaster was most violent, generally affects a country's entire population in one way or another. In some cases irradiation even reaches neighbouring countries (migrations, vector transmission, increased risk due to deterioration in watersheds, reduced demand for imports, interrupted communications, etc.).

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[2] See Ken Sudo (1994), review *Disasters No. 17*, January-February.

11. All things considered, the long-term effects of disasters seriously affect countries' prospects for development. This calls into question at least two aspects related to a country's development strategy: first, understanding that resources earmarked for preventing and mitigating the impact of natural phenomena are a very high-yield investment, both in economic and social and political terms, in line with long-term growth. Second, the spending actions and decisions that are taken once a phenomenon has arisen, must be seen from the perspective of reducing vulnerability, in other words, in a combined reconstruction and transformation approach aimed at positively and progressively modifying the degree of vulnerability and, therefore, the prospects for future development.

12. Vulnerability reduction is a key investment, not only to reduce the human and material costs of natural disasters, but also to achieve sustainable development. To put it another way, such investment is highly profitable in social, economic and political terms. Therefore, vulnerability reduction must be a fundamental part of a systemic and comprehensive vision of development.

13. An appropriate vision of a comprehensive development strategy must be based on four pillars: competitiveness, equity, governability and vulnerability reduction. The first two, competitiveness and equity, are beyond the scope of this document, and it will deal with vulnerability reduction and the related aspects of democratic governability. [3]

14. Making a link between vulnerability reduction and governability is justified not only because "there is a direct relationship between economic development and the quality of the process of government", [4] but also because in the past too little attention has been paid to political and institutional vulnerability, except when those agencies specifically responsible for catastrophe management are under examination (civil defence, emergency commissions, etc.). However, political and institutional vulnerability, understood as institutional weakness as a whole, and more specifically the weakness of the democratic system, has often been seen as one of the major causes of vulnerability where natural phenomena are concerned and, in turn, even as a cause underlying other forms of vulnerability. Indeed, the weakness of the democratic system has negative consequences for the efficiency of public policies, the legitimacy of government action, participation by citizens and the private sector in national efforts, linkage with local governments and civil organizations, the handling and management of emergencies, the processing of citizens' demands and needs, and the ability to meet them.

15. There is a close relationship between the need to reduce vulnerability and the increase in the organizational and participatory capacity of communities, the private sector and government. It is equally necessary that the international community bring its policies into line with this vision of vulnerability reduction as a basis for sustainable development. The limited

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[3] The Inter-American Development Bank (IDB) and ECLAC for many years have been researching the relationship between equity and development, and the conditions for a competitive international insertion of the countries of Latin America and the Caribbean. In addition, it must be clear that although this document does not deal with equity in itself, reducing poverty and degrees of socioeconomic exclusion is a priority of any vulnerability reduction strategy.

[4] IDB (1996), *A frame of reference for Bank action in Programs for modernization of the state and strengthening of civil society* (GN-1883-5), March 13.

vision of institutional capacity that has prevailed until now, has often led to the creation of institutions guided and managed with criteria that are not participatory, with centralized procedures, limited to emergency response with neither prevention nor foresight, with vertical structures and very low budgets. Moreover, in some cases legislations do not even explicitly define the concepts of prevention and mitigation. However, the process of democratization, including greater mass media penetration and the resulting sensitivity to these problems, is giving rise to more comprehensive risk management efforts, that increasingly include the necessary linkage among central governments, local governments and civil organizations, together with a more coordinated and effective international aid effort.

16. A vulnerability reduction strategy as a basis for sustainable development must follow several basic action lines the most important of which are comprehensive risk management, the strengthening of macroeconomic capacity, active policies to reduce the most acute distortions, the coordination of regional and subregional policies, the strengthening of the democratic system and the increase, reorientation and coordination of international aid.

# I. DISASTERS AREA DEVELOPMENT PROBLEM

The natural phenomena capable of causing damages to the populations and economies of countries, and by extension to their social and political systems, are part of the geodynamic processes of the life of the planet. The same cannot be said of their effects, which can be avoided or reduced substantially. It was no coincidence that 95% of the deaths due to natural disasters in 1998 were in developing countries, nor that, for some of these countries, disasters that in developed countries have marginal effects on the population and economic activity as a whole, had devastating effects on the standard of living of their populations and their development prospects.

Natural disasters are clearly a development problem. First, because certain natural phenomena, including those of a hydrometeorological, geoseismic and vulcanological origin tend to have greater social, economic, environmental and political impacts on developing countries than on developed countries. Second, because several factors associated with a low level of development, as will be seen below, exacerbate such impacts. Third, because the impact of natural phenomena on the prospects for long-term development is considerably greater in less developed countries.

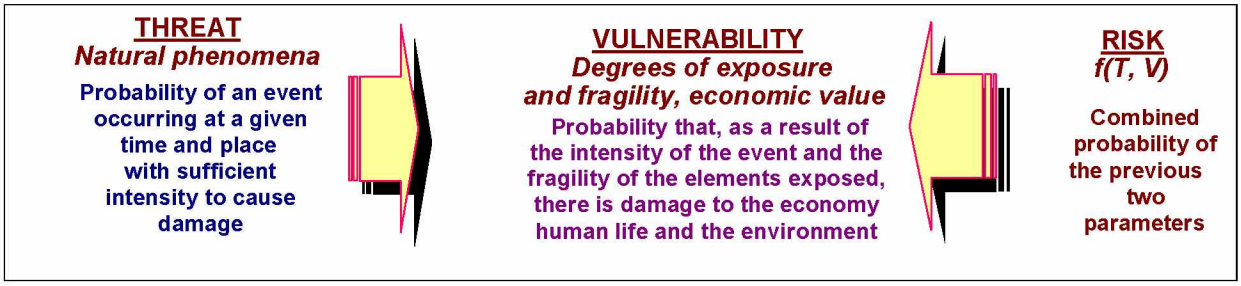
While the effects of natural disasters are a development problem, confronting them in a systematic and coherent fashion —in their causes, and in prevention, mitigation, reconstruction and transformation to reduce vulnerability— must be an explicit objective of countries' development strategies.

## 1. Threat, vulnerability and risk

The term vulnerability has taken on a new and increased importance due to the greater scale of disasters. In general terms, it may be defined as the probability of a community, exposed to a natural threat, given the degree of fragility of its elements (infrastructure, housing, productive activities, degree of organization, warning systems, political and institutional development), suffering human and material damages. The magnitude of such damages is, in turn, related to the degree of vulnerability.

Vulnerability may be analysed from different perspectives (physical, social, political, technological, ideological, cultural and educational, environmental, institutional), although in one way or another all are actually related. It is a direct result of factors said to be anthropic, that is, related to the interaction between man and nature. Risk arises as a product of the a priori function linking threat and vulnerability, and is intrinsic and latent within society, although its level, degree of perception and means used to confront it, depend on the guidelines laid down by that society. All in all, vulnerability and risks are related to the political decisions a society has taken over time and, therefore, depend on a country's or region's development. Figure 1 shows this relationship among threat, vulnerability and risk.

Figure 1




Vulnerability is, therefore, a precondition that reveals itself during a disaster, when not enough has been invested in prevention and mitigation, and an excessively high risk level has been accepted. This shows that when defining a preventive policy, before all else vulnerability must be reduced, since the forces of nature cannot themselves be eliminated. Nevertheless, it must be made clear that an analysis of the vulnerability of structures is not enough, and the structure of vulnerability must also be understood: what or who is vulnerable and why?

It must be added that the most fragile and vulnerable population groups are the poor, and among them, women, children and ethnic minorities. The poor live in the areas at greatest risk, use environmentally damaging farming techniques or work marginal land, have less access to information, basic services and pre and post disaster protection. This greater vulnerability of poor population groups is also related, where the democratic political system is limited or precarious to their scarce possibilities of participation in public politics. In many ways, poverty closes and exacerbates the vicious circle of disasters.

## 2. Latin America and the Caribbean: a very disaster-prone region

It has been shown that Latin America and the Caribbean region are especially prone to catastrophic phenomena. Disasters are recurrent and in the last 30 years almost all the countries in the region have suffered a large-scale natural disaster. In addition, with the exception of Asia, the region has the largest number of victims per disaster (see attached table).

In addition, this type of occurrence is becoming more frequent. Since the first reliable records, it has been established that the region has faced an average of 10.8 large-scale disasters per year. However, between 1900 and 1989, the average was 8.3 disasters per year, which rose to 40.7 per year between 1990 and 1998. [5] The situation has been exacerbated by social, economic, environmental and political factors, and by the lack of elements and tools to reduce vulnerability and its causes: rapid demographic growth, migrations, poverty, the concentration of population in vulnerable areas, low quality infrastructure, housing and services, environmental damage caused by the overexploitation of natural resources, and the low level of preparedness for emergency situations.

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[5] Data base 1999 EM-DAT.

Table

LATIN AMERICA AND THE CARIBBEAN: SUMMARY OF DISASTERS ASSESSED, 1972-1999

| Date | Affected population | | Total damages (millions of 1998 dollars) | | | |
|---|---|---|---|---|---|---|
| | Dead | Directly affected | Total | Direct | Indirect | Effect in the balance of payments effects |
| Accumulated 1972-1999 | 108,000 | 12,086,245 | 50,099 | 28,954 | 21,146 | 17,112 |
| 1972-1980 | 38,042 | 4,229,260 | 8,523 | 4,927 | 3,596 | 2,499 |
| 1980-1990 | 33,638 | 5,442,500 | 17,821 | 12,651 | 5,170 | 7,326 |
| 1990-2000 | 36,320 | 2,414,485 | 23,755 | 14,624 | 12,380 | 7,287 |

Source: ECLAC, based on studies made between 1973 and 2000.

In this document, most of the references are to natural or quasi-natural disasters; they are mostly meteorological or geological in origin. In the region the effects of changes in marine currents and wind patterns that lead to floods, droughts and short and medium-term modifications in climate, water quality and production and fishing patterns on the coasts of the Pacific Ocean, especially in South America, have taken on greater importance and aroused ever more interest. After the devastating effect of El Niño in 1982-1983, its cycle accelerated and in its most recent manifestation (1997-1998) it caused damages in the countries of the Andean Community estimated at more than 7.5 billion dollars.

The Caribbean lies in the path of the hurricanes and tropical storms that are born on the coasts of North Africa. For its part, the continental area in the region lies within what is known of the "Ring of Fire" that surrounds the Pacific Ocean, and many of the countries in the hemisphere are within an area of tectonic plate and fault friction and activity. The recurrence of volcanic eruptions and the cyclical activity of numerous volcanoes have left their mark on the history and culture of many communities.

As was noted above, this vulnerability is exacerbated by economic development and settlement patterns that, in general terms, insure that the highest-risk areas and the lowest-income communities and populations coincide: poverty and risk maps overlap closely.

## 3. Scale of damages in Latin America and the Caribbean

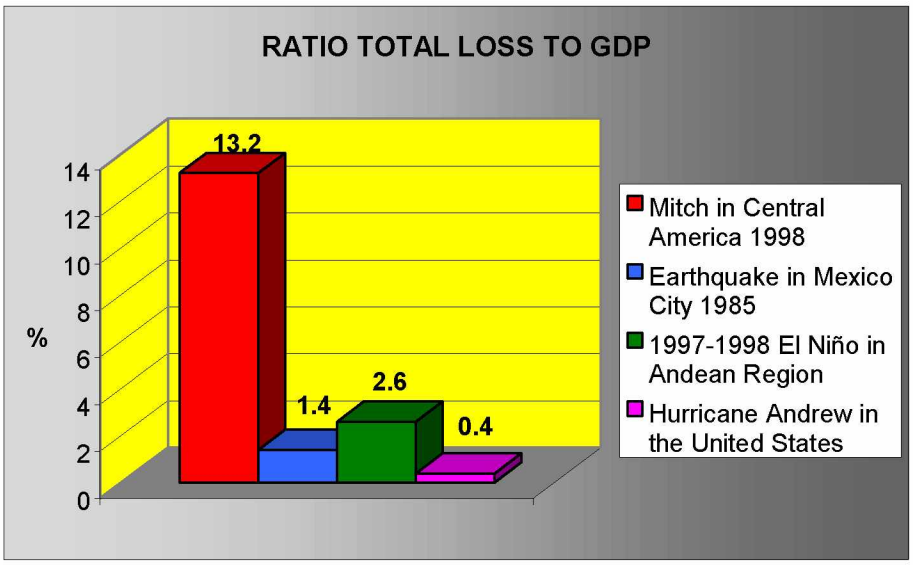
The scale of human and economic damages caused by natural disasters in Latin America and the Caribbean is staggering by any set of measurements. Some estimates put the affected (directly and indirectly) population at 150 million. According to the figures compiled by ECLAC, between

1972 and 1999 alone the number of dead reached 108,000 and the total of those directly affected exceeded 12 million

There follows a summary of the macroeconomic effects of some disasters chosen for their scale and importance in Latin America and the Caribbean, assessed in accordance with the ECLAC methodology based on information collected in the period immediately after the events (again, see table above and graphs 1, 2 and 3).

Graph 1

COMPARISON OF SCALES




Source: ECLAC, based on studies made between 1973 and 2000.

The total amount for damages arising from the sum of the assessments made by ECLAC (more than 50 billion dollars, that is, approximately two billion dollars a year between 1972 and 1999) is not, however, sufficiently indicative of the region's total losses in the period which were, undoubtedly, much higher than that figure. First, the result is from a sample, because it only brings together those events which were assessed at the request of the countries: consider, for example, the fact that in the case of Mexico only the 1985 earthquake is calculated (with direct and indirect damages greater than four billion dollars) and, in accordance with a recent study, Mexico suffered losses as a result of natural disasters greater than 9.7 billion dollars between 1980 and 1998 alone. Second, records often report the worst events, but over time there are many other less important disasters that affect small, generally poor communities, that are not properly quantified.

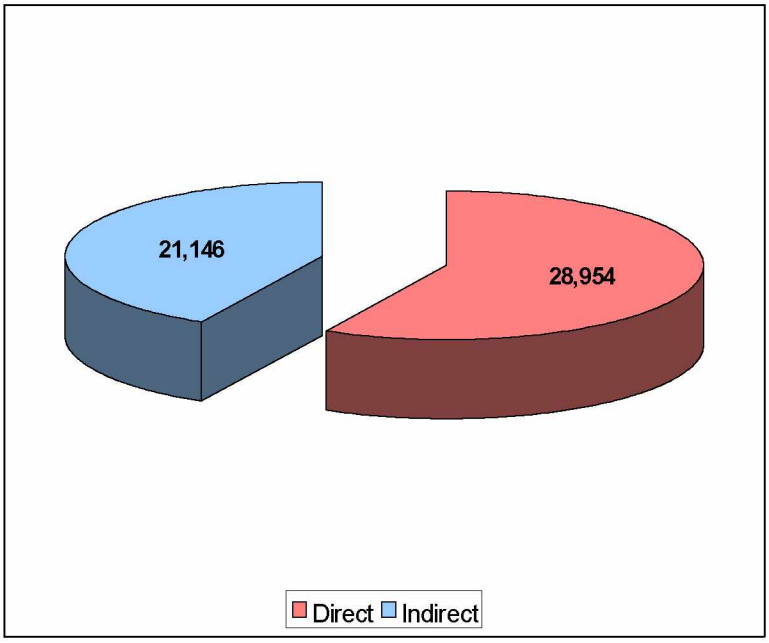
This means that, to a large extent, the estimated value is only the tip of the iceberg, and the overall and accumulated effects of such events are much greater and not totally covered in regional development statistics.

In addition, when considering the damages caused by natural disasters, the extremely disturbing effects on the emotional stability of the affected population, dislocations of large population groups and, to no lesser extent, the impact on social and political stability, must all be taken into account. Many major political and social crises have arisen from these catastrophes and as a result of the quality of the governmental response, highlighting the importance of political and institutional factors when considering this subject, both from the perspective of vulnerability prevention and reduction and that of the effects of the natural phenomena themselves.

Graph 2

LATIN AMERICA AND THE CARIBBEAN: DIRECT AND INDIRECT DAMAGE CAUSED BY DISASTERS, 1972-1999

(Millions of 1998 dollars)

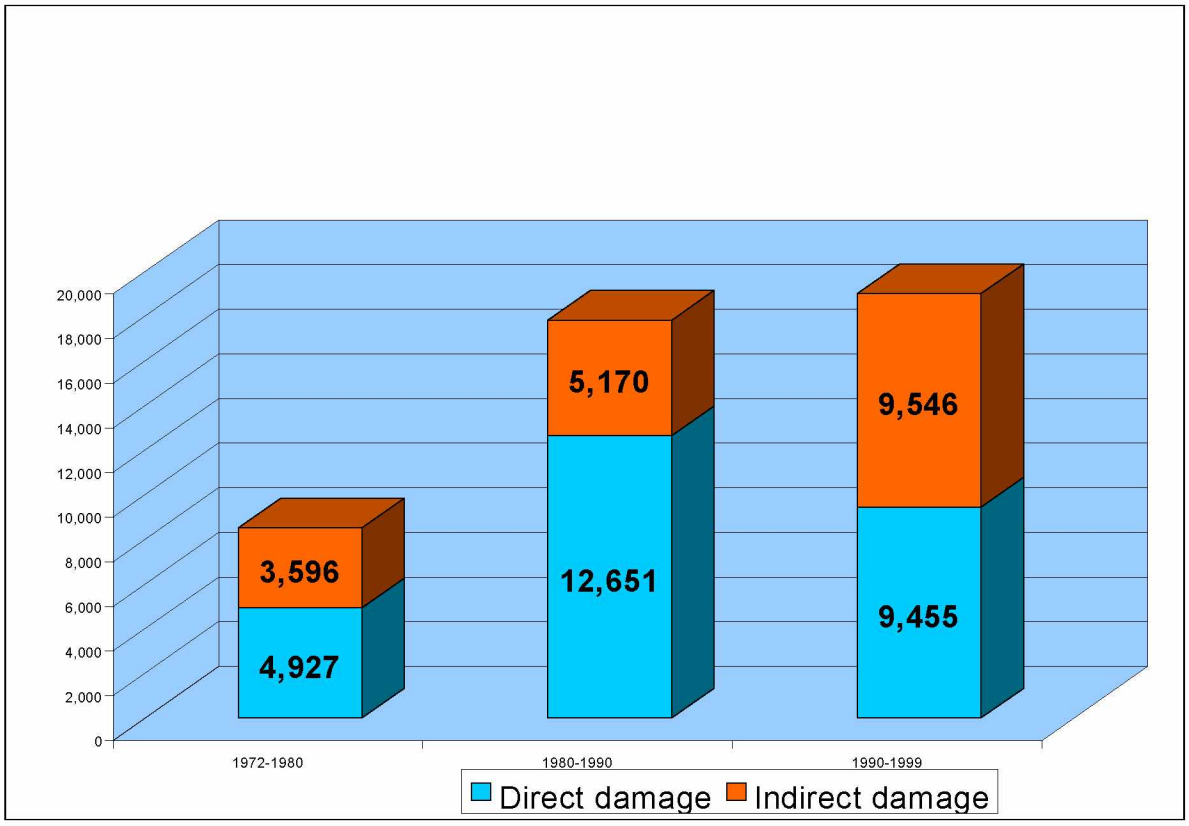



Source: ECLAC, based on studies made between 1973 and 2000.

Graph 3

LATIN AMERICA AND THE CARIBBEAN: DAMAGE CAUSED BY NATURAL DISASTERS

(Millions of 1998 dollars)




Source: ECLAC, based on studies made between 1973 and 2000.

In general, the experience accumulated in Latin America and the Caribbean shows that there is no one given behaviour or pattern in the effects and scale of the damages caused by different disasters. Rather, the resulting pattern is determined by a combination of factors including the size of the economy and its situation before the event, the structure of production, the nature and scale of the phenomenon, the moment (time and duration) at which the disaster takes place, the degree of social organization and participation, political and institutional capacity, and the way in which the government, society and the international community face the problem. However, as a general rule, smaller and less developed countries suffer significantly greater damages.

Some disasters may be concentrated in a given region or area and, although they have massive and devastating effects on a population nucleus or certain productive areas (the Mexico City earthquake of 1985, coffee growing area of Colombia, and mudslides in Venezuela in 1999), the overall impact on society as a whole depends on the characteristics noted in the previous paragraph. In the aforementioned cases, although the economic and social costs were extremely

high for the affected population and area, the effects on the country's economic activities and population as a whole were relatively limited.

Other geographically focussed disasters with lower absolute damage totals have much more important overall effects of scale on the economy. This is the case of the Managua earthquake of 1972 or hurricanes like Luis and Marilyn that affected smaller islands in the Antilles in 1995, and Lenny in 1999. In other words, the scale of the damage must be understood in the context of the size of the economy of the country affected, the diversification of its productive activities and its institutional complexity. The same may be said of the effects of El Niño in Ecuador (1982, 1987 and 1998).

This relationship between the characteristics of the phenomenon and its macroeconomic impact may be seen in different cases. A disaster may have high costs in absolute terms —as was the case of the Mexico City earthquake with losses of 4.1 billion dollars (current value)— but, in view of the size of the country's economy, it had relatively modest macroeconomic effects. The same may be said of such events as hurricane Andrew in 1993 or the Los Angeles earthquake in 1994, but due to the scale of the United States' economy and its capacity for reconstruction, the influence of the damages was limited to a small geographic area.

Other events can have more widespread geographic repercussions (for example Honduras, 1974; Grenada, 1975; Antigua and Barbuda, 1975; Guatemala, 1976 and, more recently, Mitch in Central America in 1998 and Lenny in the eastern Caribbean in 1999). In these cases, the effects and costs, apart from devastating and massive, are widespread over a broad territory and affect numerous activities.

Attention must also be paid to the fact that what may be small effects in overall terms may mask huge losses for the affected population in material terms, changes to sources of employment, disruption to family and social relationships; victims are not capable of overcoming such effects on their own and moreover such losses cannot be transformed into projects that attract finance from institutions or the interest in general of international aid. Many of these events remain largely unnoticed, concentrated in rural areas and affecting poor population groups, with low levels of income, organizational capacity and political representation, both in terms of national governments and the international community.

The time frame in which disasters occur also influences the nature and seriousness of the damage. In predominantly agricultural economies, disasters that come at a certain stage of the growing cycle or season can make production losses greater or last for several months. Many hurricanes, floods or torrential rains have coincided with the harvest (Honduras, 1974) and thus had a greater immediate impact. In the case of Mitch (1998), some crops were lost in the fields or just after storage (mangoes, avocados, etc.), and in other cases the rains destroyed plantations with a long growing cycle (palm oil or banana), so that the normal production will not be fully restored for several years.

In a broader sense, the consequences of a disaster may also depend on the situation facing the affected country. In the case of the Managua 1972 earthquake, reconstruction was hindered by the complex domestic and international political situation in which the country became involved after 1973, and the way in which the government confronted the catastrophe. After the

El Salvador earthquake in 1986, reconstruction work was undermined by the fragile financial and political situation faced by the country and the fact that it was afflicted by a civil war. In the recent case of El Niño, the Asian crisis or the fall in oil prices heightened vulnerability and negative impacts, and were even worse than those of the actual meteorological disaster in certain countries.

In some cases, the urgency of undertaking reconstruction tasks comes into conflict with other social plans or economic commitments. An example of the first type (social commitments) is Guatemala (Mitch, 1998), where the task has been postponed, incorporated into the peace agreement programs after the end to the civil war. Economic commitments include those cases in which reconstruction planning will have to fall in line with stabilization and adjustment program goals (Ecuador after the 1998 El Niño). In the most recent cases these serious dilemmas have been acknowledged by financial institutions and some donors who have made foreign debt forgiveness or payment postponement a significant part of post disaster aid (Dominican Republic/Georges, 1998, Nicaragua and Honduras/Mitch, 1998).

After some large-scale disasters, or when the amount of the assets damaged and lost is large in proportion to the size of the economy, reconstruction efforts can bring about important changes in the medium and long-term with repercussions for an entire country. When reconstruction depends directly on access to foreign resources, execution will be also limited by domestic productive capacity and institutional organization for operational management. In some cases (El Salvador, 1985; St. Martin, 1996), one important limitation was the construction sector's lack of capacity and the shortage of available labour, resulting in a temporary migration of workers. In other circumstances, the total capacity of the construction sector has responded to the effort required (Guatemala, 1976), focussing resources and multiplying its effects throughout the economy for several years.

In other cases, changes in priorities as a result of reconstruction needs can lead to social tension and conflict arising from competition for resources among the reconstruction program and previously existing plans that are postponed; they may also come into conflict with stabilization goals or it may be impossible to obtain the necessary resources (Ecuador, 1998).

In all of the aforementioned patterns the ability of institutions to cope with emergencies —it is often the case that a late or inappropriate reaction can exacerbate the consequences of the phenomenon— and undertake reconstruction is of utmost importance.

## 4. The consequences of natural disasters in the long term

Disasters have significant effects, normally negative ones, on the prospects for long-term development in the region of Latin America and the Caribbean. The cumulative effect —based on the incomplete observation of the events from 1972 to the present made by ECLAC— shows a growing trend in direct effects (see annex I), but the scale of macroeconomic effects has mushroomed in a much more important way.

The considerable growth of these effects in the most recent period seems to be linked to the seriousness and increased frequency of the phenomena and the existence of a greater

concentration of infrastructure and growth of human activity as the process of development advances, in addition to improvements in the methodology and systems to record damages. The scale of the damages recorded, moreover, highlights the fact that the process of development followed in the region —models for human settlements and the spatial distribution of activities, and the pattern of land and resource use— has not afforded the correct priority and importance to risk mitigation and adequate management criteria.

The predominance of cumulative negative effects as a result of disasters is explained by the fact that the countries affected in the region never manage to obtain all the resources needed to completely replace the assets lost, much less to rebuild them with significant improvements where risk reduction is concerned. If this is true for the region as a whole, it is more so for the smaller, less diversified economies which as a result are more vulnerable, because in these cases reconstruction processes take long periods in which the reduction of activities and production (indirect effects and secondary consequences) are not compensated for with the increase in replacement activity. Moreover, as has already been mentioned, the costs of disasters, as a proportion of the economy as a whole, are significantly greater.

The long-term impact of catastrophes may be manifested in different ways. The long-term macroeconomic effects are reflected in a large number of variables and may be summarized as a downtrend in per capita income. The experience of Latin America and the Caribbean confirms the hypothesis that there is a high correlation between GDP growth and the annual number of disasters. [6] One of the most important effects of a disaster is the immediate worsening of the national living standards. This effect, albeit mostly concentrated in the directly affected population living in the area where the disaster was most violent, generally affects a country's entire population in one way or another. In some cases irradiation even reaches neighbouring countries (migrations, vector transmission, increased risk due to deterioration in watersheds, reduced demand for imports, interrupted communications, etc.).

In addition to losses and damage to infrastructure and the provision of basic services due to the interruption of vital communication links, which will be examined below in greater detail, there is large-scale destruction of family assets and a deterioration in social ties. Housing and personal effects are lost and often never fully recovered. Thus patterns of behaviour and production are altered in a lasting way that goes beyond replacement and reconstruction.

Investments made in repair and reconstruction processes displace priorities and previously considered increases in assets, and this postpones improvements to productive and social infrastructure. In general, they do not fully restore previously existing conditions. In the case of Managua, for example, 27 years after the earthquake, the old capital has not been rebuilt and the structure of the current one —due to its spread out nature— involves high transportation costs and a lack of historical reference points as the old ones were not replaced.

Another negative effect that survives in the medium and long-term is related to the fact that in some reconstruction processes, certain conditions of inequity or negative bias in distribution have been worsened, permanently affecting well-being (Nicaragua, 1972; Guatemala, 1976). In the recent case of the coffee growing area of Colombia (January 1999), for example,

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[6] See Ken Sudo, op. cit.

reconstruction plans provide for the replacement of the affected owners' housing; however, most victims left homeless rented their homes, and no support programs were originally designed for them.

Some disasters have effects that modify development patterns because they severely and unequally affect different sectors of the economy. This is the case of El Niño in Peru when both in 1972-1973 and in 1982-1983 there were serious setbacks in fishing and connected industrial activities because the phenomenon led to the virtual disappearance of pelagic species in the coastal areas of the Pacific Ocean for a long period. The direct impact on fishing communities and labour in the industry caused migratory pressures and displacements toward other activities and areas home to other industries; in many cases migrants took refuge in informal activities (Bolivia, Ecuador and Peru, 1982). In the case of Mitch (Central America, 1998) migratory flows have arisen and it is to be expected that the relatively long period required for the recovery of banana production in Honduras will put pressure on unemployment figures and, even if there is a rapid reconstruction process, the transfer of agricultural activities toward the construction sector will not happen without friction.

The absolute scale of a disaster and the context in which it exists (size, characteristics, and cycle of the affected economy) are closely correlated, as was stated above. The case is taken of El Niño, with different repercussions in each country not only due to the diverse effects (droughts, floods, climate change, etc.), but also to the characteristics of each economy affected. This was true in 1982-1983, and again in 1997-1998. In Central America, the effects of some disasters remained for decades, as in the cases of Nicaragua (1972), Guatemala (1976) and El Salvador (1986). Experts agree that the effects of Mitch (1998) will be felt for at least a decade. Moreover, this disaster led to setbacks in some indicators that had made improvements in the nineties.

There follows a specific examination of the most important long-term economic effects of natural disasters:

### a) Destruction of economic and social infrastructure

Although damage is due to direct destruction during a disaster, or immediately thereafter, with serious short-term implications, replacement almost always takes place over relatively long periods. This has impacts on the social fabric and functional linkages that are difficult to measure, both spatially and socially. The effects of disasters are not equitable: they normally affect the poorer populations who by definition have a greater degree of vulnerability; in the same way, progressive reconstruction tends to reach those social strata that are most isolated or least capable of bringing pressure to bear. During this time, the economy as a whole and the most affected sectors in particular operate under abnormal conditions. Concrete examples of long-term effects due to damage to infrastructure include roads and the agricultural sector hit by hurricane Fifi (Honduras, 1974); electrical services (San Salvador, 1985); marine resources (Peru, 1982 and Nicaragua, 1992), hotel services (Gilbert in Mexico, Georges, 1998 in the Dominican Republic, etc.).

### b) Environmental change

Losses of environmental assets and services, only tentatively assessed in the most recent events (El Niño 1997-1998, hurricanes Georges and Mitch in 1998, and Venezuela in 1999), have impacts that go beyond protected areas or ecological reserves and that will affect production cycles in the medium and long-term —especially in agriculture, fishing and forestry—, but that will also modify risk levels and will require changes in patterns of human settlements. To the above must be added the effects due to losses of environmental services with measurable economic consequences. It must be remembered that the environmental impacts of some phenomena are transnational, affecting zones shared by neighbouring countries.

### c) External imbalances

As short-term imbalances lead to increased indebtedness, an additional service burden emerges that alters the debt profile and reduces the ability to obtain access to new loans or commit the investment resources that in other circumstances could increase productive capacity or be directed toward long-term social spending. See Guatemala, 1976, El Salvador, 1985, Peru, Bolivia, Ecuador, 1982 and Mitch, 1998.

### d) Extraordinary fiscal imbalances

Short-term fiscal imbalances are a result of the need to make emergency budget allocations and to make immediate repairs after a disaster. These alterations may continue into the medium-term due to a fall in tax revenue as a result of the direct and indirect effects of the disaster. As time passes, the government's capacity to maintain or improve certain public services or maintain certain activities is gradually affected. This has been observed in social services, such as education and health. These imbalances, together with external ones, reduce the room for manoeuvre of countries when it comes to international sources of finance.

### e) Inflationary processes

The immediate effects on prices of market changes are complicated by the monetary effects of reconstruction, even when it is carried out with donated resources or external finance. Moreover, fiscal deficits can lead to inflation when fiscal and monetary policies do not take this potential problem into account. Beyond the short and medium-term effects, damage to infrastructure can change production costs and unleash a rise in prices in the economy as a whole. Therefore, when reconstruction includes all economic sectors, it can affect its operation and produce overheating incompatible with stabilization and structural adjustment goals. Such inflationary processes weaken growth and investment capacity and can further worsen income distribution profiles, with a resulting increase in poverty rates.

### f) Negative income redistribution

Natural disasters often have a dramatic negative impact on income distribution. In addition to the reasons mentioned above —loss of employment, destruction of goods and services networks, inflation, greater fiscal burden, etc.— in developing countries insurance coverage against such events is limited, and insurance companies normally only offer coverage to the largest and most modern economic sectors and wealthiest social strata. Therefore, the economic reactivation that occurs after these catastrophes —as a result of the investment opportunities generated by the replacement of destroyed assets, finance flows from insurance payments and other additional forms of finance— tend to sketch an income and wealth profile that is much more inequitable than the situation prior to the event. Added to this, public economic and social infrastructure lacks insurance coverage.

To sum up, the long-term effects of natural disasters tend to be substantial and diverse, with serious impacts on countries' prospects for development. This calls into question at least two aspects related to a country is development strategy: first, understanding that resources put into preventing and mitigating the impact of natural phenomena are a very high-yield investment, both in economic terms and in terms of the social and political environment favourable for long-term growth. Second, the spending actions and decisions taken, once a phenomenon has arisen, must be seen from the perspective of reducing vulnerability, in other words, in a combined reconstruction and transformation approach aimed at positively and progressively modifying the degree of vulnerability and, therefore, the prospects for development (annex I covers the scale of damage, and offers a classification of disasters and their impact).

## II. VULNERABILITY REDUCTION FOR SUSTAINABLE DEVELOPMENT

The previous chapter examined the empirical reasons and situations that make natural disasters a development problem, both in terms of causes and the conditions required to confront them successfully, and governments, social stakeholders and the international community must view them in the same light.

This chapter concentrates on the idea that vulnerability reduction is a key investment, not only to reduce the human and material costs of natural disasters, but also to achieve sustainable development. Such investment is highly profitable in social, economic and political terms. Therefore, vulnerability reduction must be a fundamental part of a systemic and comprehensive vision of development.

A comprehensive vision of a development strategy must be based on four pillars: competitiveness, equity, governability and vulnerability reduction. The first two, competitiveness and equity, are beyond the scope of this document. This chapter will analyse vulnerability reduction and the related aspects of governability.

Making a link between vulnerability reduction and governability is justified because in the past a great deal of attention has been paid to the physical, social, economic and environmental aspects of vulnerability and too little attention has been paid to political and institutional vulnerability, except when those agencies specifically responsible for catastrophe management are under examination (civil defence, emergency commissions, etc.). Political and institutional vulnerability is understood as institutional weakness as a whole, and more specifically the weakness of the democratic system —with its negative effects on the efficiency of public policies, the legitimacy of government action, limited participation by citizens and the private sector in national efforts, linkage with local governments and civil organizations, the handling and management of emergencies, processing of citizens' demands and needs, and the capacity to meet them. This has often been seen to be one of the prime causes of vulnerability to natural phenomena and, in turn, even a cause underlying other forms of vulnerability. Inset 1 presents a brief list of some political and institutional aspects related to vulnerability. Inset 2 deals with this issue in a graphic and simplified manner.

**Inset 1**

- Institutional weakness: inefficient public policies, legislation and standards; poor information systems, observation and early warning; shortage of financial and human resources and equipment.
- The conceptual link between human activity-environmental impact-disaster is not made, and there is no clear vision of the correct use of space and other natural resources.
- Low quality works: lack or no enforcement of standards, preventive protection or environmental management.
- The population does not see nor confront threats and disasters with a preventive mindset: lack of historical memory of causes and effects of disasters; lack of options for the poorest groups, making them even more vulnerable.
- Centralization: the scarce participation by the private sector, civil organizations and local governments make disaster prevention and attention inefficient; the weakness of democracy and problems of governability limit participatory development.
- Prevention has not formed part of political discourse and has not been given a priority status within government policies and even less so in State policies.
- The meaning of the socioeconomic and environmental impact of disasters is not understood or is ignored: prevention is still seen as an expenditure, not as an investment. Investment does not allow for funds to cover the option of privatizing the cost of disasters through insurance.
- Little linkage between the scientific community and the results of its research with the policy-making process in the field of disasters and prevention.

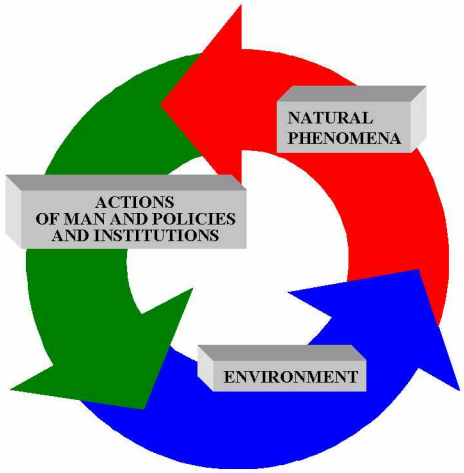
**Inset 2**

**Vicious circle: man, environment and disasters**

**The actions of man and policies and institutions progressively harm the environment**

**Extreme natural phenomena negatively impact the environment**

**Greater impact of disasters**



As a growing wealth of knowledge and empirical evidence shows that "there is a direct relationship between economic development and the quality of the process of government", [7] political and institutional vulnerability must be explicitly included in vulnerability reduction strategies for sustainable growth.

More specifically, the close relationship between the need to reduce vulnerability and to increase the organizational and participatory capacity of communities, the private sector and government must be taken into account. The limited vision of institutional capacity that has prevailed until now has often led to the creation of institutions guided and managed with criteria that are not participatory, with centralized procedures, limited to emergency response with neither prevention nor foresight, with vertical structures and very low budgets, based on legislations that, in some cases, do not even explicitly define the concepts of prevention and mitigation. However, the process of democratization, including greater mass media penetration and the resulting sensitivity to these problems, is giving rise to more comprehensive risk management efforts, that increasingly include the necessary linkage among central governments, local governments and civil organizations.

The basic elements required to incorporate vulnerability reduction in a sustainable development strategy are presented below.

## 1. Comprehensive risk management

Each country must define a comprehensive risk management plan based on certain basic elements such as: the consideration and provision of resources for preventive investment, with a special emphasis on the principles, strategies and processes of land regulation to reduce vulnerability; the incorporation of vulnerability and risk factors in development project and program preparation and assessment cycles; steps to ensure repair and reconstruction programs are not a simple reconstruction of vulnerability; creation and strengthening of information, observation, forecasting, research, oversight and early warning systems; development of institutional facilities, with the allocation of appropriate resources, to manage emergencies and disasters; design of permanent linkage and cooperation facilities with the private sector, civil organizations especially in the affected communities, and specialized agencies from the international community; execution of permanent population education programs.

The conceptual bases for the creation of a strategic process leading to comprehensive risk management are summarized in inset 3.

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[7] IDB (1996), op. cit.

**Inset 3**

**ELEMENTS FOR COMPREHENSIVE RISK MANAGEMENT**

1. Document historical memory.
   - Permits an appropriate orientation of the planning process for the sustainable development of the country, taking prevention to be an indispensable element.
   - Avoids making the same mistakes, not rebuilding vulnerability.
2. Use a classification for disasters and their effects.
   - Use of information provided by aerial photography, satellite images, cartography, geographic information systems (GIS).
3. Analyse the human factors that generate vulnerability and exacerbate the scale of disasters.
   - Study of the influence of economic factors and productive activities in the social dynamic that cause and spread vulnerability such as:
   - Demographic growth, chaotic expansion of cities, infrastructure, productive activities of goods and services.
   - Sociocultural situation, structure of leadership and organization.
   - Poverty as a cause and effect of disasters.
4. Land management policies.
   - Improvements to legislation and control mechanisms.
   - Availability of emergency, stabilization and correction plans.
5. Incorporation of vulnerability and risk factors in the project and program preparation cycles.
   - Modern oversight, warning, alarm, and evacuation systems.
   - Establishment of scenarios and processes.
6. Consideration of prevention as a state policy.

## 2. Strengthening macroeconomic capacity

As was mentioned before, the scale of the effects of certain natural phenomena is related to the condition of the economy and the structure of production. Against this background, actions must be increased to strengthen macroeconomic capacity, especially fiscal capacity, so that countries can better absorb the shocks resulting from natural phenomena (availability of resources to confront the emergency and reconstruction without generating inflationary pressures; foreign debt margin, etc.). In turn, fiscal and foreign debt capacity is essential to be able to make the preventive investments whose importance has been highlighted throughout this document.

In addition, a solid macroeconomic situation and a policy of strengthening the financial system (normally low penetration, especially in less developed countries), together with feasible risk management plans, will help to expand the insurance market, whose importance in mitigating the effects of natural phenomena and making reconstruction possible has also been highlighted above.

### 3. Active policies to reduce distortions

Each country can identify specific distortions, such as for example constant migratory flows from rural areas and small towns, and define active policies to reduce and eliminate such problems. In the aforementioned example, rural development programs that ensure conditions of greater productivity and living standards for the rural population are indispensable. Likewise, regional development policies and programs are required to eliminate serious geodemographic distortions. Finally, the relocation of populations away from high-risk areas and strategies to reduce urban overcrowding are other examples of active policies aimed at reducing the distortions that aggravate vulnerability.

### 4. Coordination of regional and subregional policies

Many of the watersheds and regions that require comprehensive management in terms of their economic exploitation and vulnerability reduction are shared by two or more countries. The coordination of policies and programs among countries with regard to such watersheds and regions, including the active participation of the private sector, is essential to vulnerability reduction for sustainable development; this is a new field for finance and international aid and, as has been mentioned above, for private investment. This approach, in turn, will strengthen regional and subregional integration processes.

### 5. Strengthening the democratic system

The association between political and institutional vulnerability and the democratic system, and between this system and vulnerability reduction in general, has been described already in this document. It must be emphasized that the strengthening of the democratic system is essential to vulnerability reduction, in turn a prerequisite for sustainable development. In this regard, at least the following aspects should be highlighted:

a) There is sufficient empirical evidence of the relationship between democracy and efficiency in public policies. In a democratic context, public policies are more able to process citizens' demands and meet them quickly. In turn, the efficiency of the state's interventions relies on a democratic atmosphere that can guarantee such interventions, through the effectiveness of a system of checks and balances, and the possibility of defining accountability, neither distorted nor perverted by the intervention of private and corporate interests. Therefore, in conditions of democracy it is more likely that considerations concerning the reduction of social, economic and environmental vulnerability can be effectively incorporated into public administration.

b) In a strengthened democratic system, facilities for citizen representation and participation will operate more effectively and the potential synergy of the relationship between government, private sector and civil organizations can develop. The mobilization of corporations and the participation of communities is essential to preventing and managing natural hazards. Likewise, in an atmosphere of democracy efficient linkages may be put in place between central and local governments, without whose participation centralized and passive risk management attitudes cannot be overcome.

c) The legitimacy and credibility of government policy, and therefore its capacity to call upon its citizens and international aid, is substantially greater when the institution enjoys prestige, based on democratic principles. This is particularly important when considering transparency and integrity in the handling and administration of resources applied to emergencies and vulnerability reduction.

d) Many of the key aspects of comprehensive risk management, such as for example compliance with building, land management and water regulations and codes, are applied more effectively in a democratic system.

e) Finally, as was indicated in the relevant part, vulnerability reduction implies seeking a consensus on policies and programs that remain in place over time and that are not subject to changes in the rules of the game and the figures in power. This is more feasible in a democratic system based, on the one hand, on negotiations and agreement instead of imposition and, on the other, on institutions and laws, and not fleeting figures or agencies.

### 6. Increase in and coordination of international aid

The international aid that to date has played such an important part in catastrophes and whose aggregate value is decisive, especially in the smallest and least developed countries, must be increased and reconsidered in line with some of the ideas discussed herein in order to make vulnerability reduction the basis for sustainable development, an objective shared by the international community. But in turn —and it must be recognized that this also depends on the ability of the countries affected to formulate their coordination requirements—, bilateral and multilateral aid agencies must make an active effort to formulate a vision and adopt practical measures that can allow a more wide-ranging and better coordination of aid to confront natural disasters as a development problem.

This is precisely one of the fundamental objectives of the conference for which this document has been prepared and also one of the purposes of the document itself.

# Annex I

# MAGNITUDE OF DAMAGES, A TYPOLOGY OF DISASTERS AND THEIR IMPACT

Table 1

EFFECTS OF NATURAL DISASTERS ON THE SURFACE OF THE EARTH, ON INFRASTRUCTURE AND ON AGRICULTURE

| Type of disaster | Effects on the earth surface | Effects on infrastructure | Effects on agriculture |
|---|---|---|---|
| Earthquakes | Tremors and cracks<br>Landslides<br>Liquefaction<br>Underground settling and rockfalls<br>Avalanches and mudslides<br>Changes in underground water courses | Damage to constructions (productive, e.g. factories; public; social; housing, and cultural heritage)<br>Diverse damage in roads, bridges, dikes and channels<br>Broken ducts: pipes, posts and wires<br>Burial and undermining of dams, silting of rivers causing local floods<br>Sinking of structures and buildings<br>Deterioration of underground constructions<br>Destruction and damage to urban infrastructure (networks, streets, equipment and furniture) | Minimal<br>Localized losses in areas affected by landslides, avalanches or liquefaction<br>Temporary loss of irrigation systems<br>Localized losses in plants and plant cover and forests |
| Hurricanes, typhoons and cyclones | Strong winds, both steady and gusts<br>Floods (due to rain and swollen and burst rivers) | Damage to buildings<br>Impact-damaged, broken and fallen distribution lines, especially overhead<br>Damage to bridges and roads due to landslides, avalanches and torrential mudslides | Loss of plant cover, fallen trees, crop damage, especially wind damage to grass species<br>Erosion affects root and tuber crops<br>Changes in natural and man-made drainage systems<br>Sedimentation, salinization, contamination and erosion of soils |
| Drought | Drying and cracking of the earth and loss of plant layer<br>Exposure to wind erosion<br>Desertification | Does not cause major losses | Loss of crops and plant cover<br>Erosion and damage to forests<br>Depositing of sand and infertile earth<br>Changes to crop types and cycles<br>Growth of arid climate, drought-resistant vegetation, such as thorn bushes and cactuses |

/Continued

Table 1 (Conclusion)

| Type of disaster | Effects on the earth surface | Effects on infrastructure a/ | Effects on agriculture |
|---|---|---|---|
| Floods | Erosion<br>Waterlogging and destabilization of soils, landslides<br>Sedimentation | Loosening of foundations and piles of buildings<br>Burial and slippage of constructions and infrastructure works<br>Blockage and silting of channels and drains | Destroys crops, alters crop types and growing cycles<br>Localized damage in land, fields and woods<br>Increased humidity improves quality of some land and makes it productive (albeit temporarily) |
| Seaquakes or tsunamis | Floods<br>Salinization and sedimentation in coastal strips<br>Contaminate water and water table | Destroy or damage buildings, bridges, roads, irrigation and drainage systems | Localized damage in crops<br>Destruction of coastal plantations<br>Changes in reproductive cycles of coastal fauna and damage to fishing |
| Volcanic eruptions | Fires, loss of plant cover<br>Depositing of incandescent material and lava<br>Depositing of ash<br>Deterioration of soils due to settling of airborne chemicals<br>Landslides, avalanches and torrential mudslides<br>Liquefaction<br>Meltwaters and avalanches | Destroys buildings and all types of infrastructure<br>Collapsed roofs due to ash deposits<br>Burial of buildings<br>Fires<br>Affects channels, bridges and overhead and underground conduction and transmission lines | Extensive defoliation<br>Damage to plant cover and forests<br>Fires in areas near eruption<br>Burial of crops, damage to productive land due to silting, contamination and landslides<br>Fires in plantations<br>Ash deposits increase fertility of undamaged soils |

Source: Adapted from Frederick C. Cuny (1983), *Disasters and prevention*, Oxford University Press, New York.

Table 2

IMMEDIATE ECONOMIC AND SOCIAL EFFECTS OF NATURAL DISASTERS, BY TYPE

| Type of disaster | Temporary migration | Permanent migration | Loss of housing | Loss of industrial production | Loss of trade | Losses of agricultural production (plants, crops, harvests) | Damage to infrastructure | Changes to market distribution and operation | Interruption of transport systems | Interruption of communications | Panic | Social disorder |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Earthquakes | | | X | X | X | | X | X | X | X | X | X |
| Cyclones | | | X | X | X | X | X | X | | X | X | X |
| Floods | X | X | X | X | X | X | X | X | X | X | | |
| Seaquakes or tsunamis | | | X | | X | X | X | X | | X | X | |
| Volcanic eruption | | | X | X | X | X | X | X | X | X | X | X |
| Fire | | | X | X | X | X | X | X | X | X | X | |
| Drought | X | | | | X | X | | X | | | | |
| Famine | X | X | | | X | X | | X | | | | X |

Source: Adapted from Frederick C. Cuny (1983), *Disasters and prevention*, Oxford University Press, New York.

Table 3

LATIN AMERICA AND THE CARIBBEAN: DISASTERS BETWEEN 1972 AND 1999 a/

| Date | Place | Type of event | Population affected | | Total damage (millions of 1998 dollars) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Dead | Directly affected | Total | Direct | Indirect | Balance of payments effects |
| 1972 (December 22-23) | Managua, Nicaragua | Earthquake (8.5 on Richter scale) | 6,000 | 300,000 | 2,968 | 2,383 | 584 | 1,187 |
| 1974 (September 18-20) | Honduras | Hurricane Fifi (sustained winds of 95 knots, equal to 165 km/h) | 7,000 | 115,000 | 1,331 | 512 | 818 | 266 |
| 1975 (November 5) | Grenada | Tropical storm | ... | ... | 29 | 12 | 18 | 9 |
| 1975 (October 8) | Antigua and Barbuda | Earthquake (7.7 on Richter scale) | ... | 4,200 | 61 | 42 | 19 | 30 |
| 1976 (February 4) | Guatemala | Earthquake (7.5 on Richter scale, aftershocks up to strength 6) | 23,000 | 2,550,000 | 2,147 | 586 | 1,561 | 644 |
| 1979 (August 29) | Dominica | Hurricane David (sustained winds of 150 knots) | 42 | 60,060 | 118 | 91 | 27 | 47 |
| 1979 (August 3 to September 7) | Dominican Republic | Hurricanes David and Frederic (sustained winds of 150 knots, 260 km/h and 115, 200 km/h, respectively, rainfall over 700 mm. Rivers swollen to 6,000 $m^3$) | 2,000 | 1,200,000 | 1,869 | 1,301 | 568 | 316 |

/Continued

Table 3 (Continuation)

| Date | Place | Type of event | Population affected | | Total damage (millions of 1998 dollars) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Dead | Directly affected | Total | Direct | Indirect | Balance of payments effects |
| 1982 (May 20-31) | Nicaragua | Floods | 80 | 70,000 | 599 | 462 | 137 | 120 |
| 1982 | El Salvador | Several natural disasters: earthquake (June 19, 5.6 on Richter scale), droughts (July to September) and floods due to tropical depression (September 16-20) | 600 | 20,000 | 216 | 165 | 51 | 65 |
| 1982 | Guatemala | Extreme weather: heavy rains in May, drought between July and September and tropical depression (September 16-20) | 610 | 10,000 | 136 | 99 | 36 | 41 |
| 1982 | Nicaragua | Floods (May) and drought (after July) | | | 588 | 168 | 420 | 176 |
| 1982-1983 | Bolivia, Ecuador and Peru | Extreme weather: El Niño | | 3,840,000 | 5,651 | 3,679 | 1,972 | 2,450 |
| | | Bolivia: droughts and floods | | 1,600,000 | 1,359 | 847 | 512 | 408 |
| | | Ecuador: floods and high tides | | 950,000 | 1,041 | 867 | 173 | 416 |
| | | Peru: extreme land and marine weather and droughts | | 1,290,000 | 3,252 | 1,965 | 1,287 | 1,626 |

/Continued

Table 3 (Continuation)

| Date | Place | Type of event | Population affected | | Total damage (millions of 1998 dollars) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Dead | Directly affected | Total | Direct | Indirect | Balance of payments effects |
| 1985 (September 19) | Mexico | Earthquakes: 7.8-8.1 on Richter scale | 8,000 | 150,000 | 6,216 | 5,436 | 780 | 2,487 |
| 1985 (November 13) | Colombia | Eruption of Nevado del Ruiz volcano and avalanche in Armero and Chinchiná | 22,000 | 200,000 | 465 | 321 | 144 | 93 |
| 1986 (October 10) | El Salvador | Earthquake (5.4 on Richter scale) | 1,200 | 520,000 | 1,352 | 1,024 | 327 | 270 |
| 1987 (March 5) | Ecuador | Earthquakes (6.1 and 6.8 on Richter scale) and aftershocks that caused avalanches and floods (in Pichincha, Imbabura and Carchi provinces) | 1,000 | 82,500 | 1,438 | 267 | 1,170 | 1,198 |
| 1988 (October 13-26) | Nicaragua | Hurricane Joan (winds of 125 knots or 217 km/h) | 148 | 550,000 | 1,160 | 1,030 | 131 | 427 |
| 1992 (April 9) | Nicaragua | Eruption of Cerro Negro volcano (sand and ash for 65 hours) | 2 | 12,000 | 22 | 12 | 10 | 3 |
| 1992 (September 1) | Nicaragua | Tsunami (seaquake 7.0 on Richter scale with 8 to 15 meter waves on Pacific coast) | 116 | 40,500 | 30 | 21 | 9 | 5 |

/Continued

Table 3 (Continuation)

| Date | Place | Type of event | Population affected | | Total damage (millions of 1998 dollars) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Dead | Directly affected | Total | Direct | Indirect | Balance of payments effects |
| 1995 (September 5) | Anguilla | Hurricane Luis (winds of 140 knots or 250 km/h) | … | … | 59 | 49 | 10 | 23 |
| 1995 (September 4-15) | Sint Maarten, Netherlands Antilles | Hurricanes Luis (winds of 140 knots or 250 km/h) and Marilyn (100 knots or 170 km/h and 85 mm rainfall) with combined rainfall of 316 mm | … | … | 1,112 | 611 | 502 | 437 |
| 1996 (July 27-28) | Costa Rica | Hurricane Cesar (winds of 70 knots or 120 km/h) | 39 | 40,260 | 157 | 86 | 71 | 72 |
| 1996 (July 27-29) | Nicaragua | Hurricane Cesar (winds of 70 knots or 120 km/h) | 9 | 29,500 | 53 | 36 | 17 | 17 |
| 1997-1998 | Costa Rica | El Niño (floods and drought - abnormal scale, location and time) | ... | 119,279 | 93 | 51 | 42 | 45 |
| 1997-1998 | Andean Community | El Niño | 600 | 125,000 | 7,694 | 2,784 | 4,910 | 2,405 |
| | | Bolivia (droughts and floods) | ... | ... | 537 | 217 | 320 | 141 |
| | | Colombia (droughts) | ... | ... | 575 | 57 | 518 | 162 |

/Continued

Table 3 (Continuation)

| Date | Place | Type of event | Population affected | | Total damage (millions of 1998 dollars) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Dead | Directly affected | Total | Direct | Indirect | Balance of payments effects |
| | | Ecuador (floods and changes in sea level and temperature) | 286 | 29,023 | 2,939 | 863 | 2,076 | 672 |
| | | Peru (floods and changes in sea level and temperature) | ... | ... | 3,569 | 1,644 | 1,925 | 1,409 |
| | | Venezuela (droughts) | ... | ... | 73 | 3 | 70 | 21 |
| 1998 (September 22-23) | Dominican Republic | Hurricane Georges (winds of 98 knots or 170 km/h) | 235 | 296,637 | 2,193 | 1,337 | 856 | 856 |
| 1998 (October 23 to November 4) | Central America | Hurricane Mitch (sustained winds of up to 144 knots or 285 km/h at maximum intensity and rainfall of over 600 mm) | 9 214 | 1,191,908 | 6,008 | 3,078 | 2,930 | 1,589 |
| | | Costa Rica | 4 | 16,500 | 91 | 54 | 37 | 18 |
| | | El Salvador | 240 | 84,316 | 388 | 169 | 219 | 73 |
| | | Guatemala | 268 | 105,000 | 748 | 288 | 460 | 23 |
| | | Honduras | 5,657 | 617,831 | 3,794 | 2,005 | 1,789 | 1,257 |
| | | Nicaragua | 3,045 | 368,261 | 988 | 562 | 425 | 218 |

/Continued

Table 3 (Conclusion)

| Date | Place | Type of event | Population affected | | Total damage (millions of 1998 dollars) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Dead | Directly affected | Total | Direct | Indirect | Balance of payments effects |
| 1999 (January 25) | Colombia | Earthquake in coffee growing area (5.8 on Richter scale with epicentre near Córdoba in the department of Quindío, affecting neighbouring Risaralda, Cundinamarca and Valle del Cauca departments) | 1,185 | 559,401 | 1,580 | 1,391 | 188 | 102 |
| 1999 (December) | Venezuela | Torrential rains with floods and avalanches that mainly affected the states of the country's central, eastern and western coasts. | … | 68,503 | 3,237 | 1,961 | 1,264 | 322 |

Table 4

LATIN AMERICA AND THE CARIBBEAN: SUMMARY OF SECONDARY EFFECTS OF SELECTED EVENTS

| Event | Economic behaviour | Fiscal effects | Balance of payments effects | Damage to infrastructure and losses of capital |
|---|---|---|---|---|
| Managua, 1972 | Fall of 15% in GDP and 46% in industrial and productive activity of Managua. | 39% fall in fiscal revenue. | Six-fold increase of current account deficit, fall of almost 20% in exports and equal rise in imports to face emergency needs. | Capital and production losses equal to seven times the fixed capital investment requirements, both public and private. |
| Honduras, 1974 | Fall of 6% in GDP due to a fall of 23% in agriculture. | 79% rise in fiscal deficit due to fall in current tax revenue of 15% and 65% increase in spending. | Three-fold increase of current account deficit. 61% growth in imports and 66% fall in exports. | Loss of national assets and fall in production equal to twice the average annual investment. |
| Antigua and Barbuda, 1974 | Fall in GDP estimated at 12%, mainly in oil refining (30%), tourism, basic services and housing. | Three-fold increase in fiscal deficit. | Four-fold increase in balance of payments deficit. | Damage to infrastructure equal to almost four times annual average investment. |
| Grenada, 1975 | 20% fall in GDP. Recovery of agriculture estimated to take 10 years until full maturity of plantations. | 60% increase in fiscal deficit. | Four-fold increase in foreign imbalances. | Capital losses and damage to infrastructure equal to five times the annual average investment. |
| Dominican Republic, 1979 | 8% fall in GDP. | Eight-fold increase in fiscal deficit. | 27% increase in foreign deficit. | Loss of capital equal to twice the annual average investment. |
| El Salvador, 1982 | 2% fall in GDP. | 30% increase in fiscal deficit. | 25% increase in foreign deficit. | Loss of capital equal to a year's investment. |
| Ecuador, 1982-1983 (estimates for 1983 only) | Almost 3% fall in GDP. | 20% increase in fiscal deficit. | 22% increase in balance of payments deficit. | Capital and infrastructure losses equal to three years' domestic investment. |

/Continued

Table 4 (Continuation)

| Events | Economic behaviour | Fiscal effects | Balance of payments effects | Damage to infrastructure and losses of capital |
|---|---|---|---|---|
| Bolivia, 1982-1983 (estimates for 1983 only) | 10% fall in GDP, 55% in agricultural sector. | More than 275% increase in fiscal deficit. | 30% increase in foreign imbalance. | Total losses estimated at 836.5 million current dollars. |
| Peru, 1982-1983 (estimates for 1983 only) | 5% fall in GDP. | 33% increase in fiscal deficit. | Increase of 30% in the current account deficit in the balance of payments. | Total losses estimated at 2.9 billion current dollars. |
| Mexico, 1985 | 2.7% fall in GDP. | 7.3% increase in fiscal deficit. | Minimal effects on balance of payments. | Total losses estimated at 4.1 billion current dollars. |
| Nicaragua, 1988 | Additional fall of 2% in GDP, 17% in agricultural sector. | 20% increase in fiscal deficit. | 10% increase in balance of payments deficit. | Total damage estimated at 839 million current dollars. |
| Nicaragua, 1992 (Cerro Negro) | Less than 1% fall in GDP. | Less than 10% increase in fiscal deficit. | 2% increase in balance of payments deficit. | Total damage estimated at 19 million current dollars, includes cumulative effect of other damage and events in the country. |
| Nicaragua, 1992 (Tsunami) | 1% fall in GDP. | Additional increase in fiscal deficit of 5%. | 24% additional increase in current account. | Losses of 25 million current dollars, severe social effects on coast dwellers, associated with increase in migrations. |
| Bolivia, 1997–1998 (El Niño) | 4.5% increase in GDP in 1998, equal to forecast before phenomenon. | Broadening of fiscal gap to 4% of GDP in 1998 only partly due to El Niño. | 12% increase in current account deficit in 1998 due to event. | Total damage equal to almost 7% of GDP in 1997 and 45% of country's gross capital formation. |
| Colombia, 1997-1998 (El Niño) | Strong increase in GDP at beginning of 1998, reduced in third quarter by the event to a rate of –0.6%. | Increase of fiscal deficit to 4.8% of GDP in 1998. | Foreign deficit higher than in 1997, 6% increase in current account. | Total damage less than 1% of GDP, still equal to more than 564 million dollars. |

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Table 4 (Continuation)

| Events | Economic behaviour | Fiscal effects | Balance of payments effects | Damage to infrastructure and losses of capital |
|---|---|---|---|---|
| Ecuador, 1997-1998 (El Niño) | Growth in GDP 1.2 percentage points lower than expected before 1998 damage. | Substantial increase (245%) in 1998 fiscal deficit. | Growth of current account surplus in 1998 lower than forecast before appearance of the phenomenon. | Total amount of damage equal to approximately 15% of 1997 GDP. |
| Peru, 1997-1998 (El Niño) | Slowdown in growth of GDP at beginning of 1998 caused by the appearance of El Niño, reducing growth to lower rate than that forecast. | 1998 current account deficit rose to 4.1 billion dollars, greater than increase forecast before the phenomenon. | Increase in 1998 fiscal deficit to 4.5% of GDP. | Losses of more than 3.5 billion dollars, equal to 4.5% of 1997 GDP. |
| Venezuela, 1997-1998 (El Niño) | 1% negative growth in GDP caused by factors not due to El Niño in 1998. | Fiscal deficit of 1.5% of GDP caused by factors not due to El Niño. | Current account deficit 1.5% of GDP, also aggravated by factors not due to the appearance of the phenomenon. | Damage mainly indirect, slightly over 11.4% of 1997 foreign investment. |
| Dominican Republic, 1998 (Georges) | 1% fall in GDP due to the 1998 event, causing a 6.5% increase over the previous year, one percentage point below the rate forecast before El Niño - 1999 growth estimated at 7.9%. | Fiscal deficit 0.6% of GDP, before hurricane a surplus of 0.8% of GDP was forecast. | Two-fold increase in current account deficit, exceeding 500 million dollars. | Total damage of 2.193 billion dollars. |
| Costa Rica, 1998 (Mitch) | 5.5% growth in GDP, not affected by the hurricane. | Consolidated public sector deficit of 3.1% of GDP, lower than rate for previous year. | Balance of payments deficit of 80 million dollars not due to the hurricane. | Total damage of 91 million dollars. |

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Table 4 (Conclusion)

| Events | Economic behaviour | Fiscal effects | Balance of payments effects | Damage to infrastructure and losses of capital |
|---|---|---|---|---|
| El Salvador, 1998 (Mitch) | 0.1% GDP decrease in the year caused by the hurricane, resulting in lower than expected growth at 3.8%. 1999 growth is also expected to be lower than forecast due to the hurricane. | Fiscal deficit of 2.2% of GDP, greater than previous year due to hurricane. | Although the current account deficit fell 19% after the Hurricane, it rose 70% in comparison to the previous year. | Total damage estimated at 388.1 million dollars. |
| Guatemala, 1998 (Mitch) | 5% growth - greater than previous year and close to initial estimates. Lower growth is expected in 1999 (3.9%) due to the hurricane. | Fiscal deficit of 1.7% of GDP, slightly higher than previous year and 2.6% of GDP forecast for 1999, also affected by the hurricane. | Increase in the current account deficit of 28% over the previous year. | Total damage of 748 million dollars. |
| Nicaragua, 1998 (Mitch) | 4%-4.5% growth in GDP severely affected by the hurricane. 1999 growth forecast at 5.1%. | Fiscal deficit of 0.14% of GDP, lower than previous year. | 1% fall in the current account deficit, with a balance of payments gap of 50 million dollars. | Total damage of 987.7 million dollars. |
| Honduras, 1998 (Mitch) | 7.5% fall in GDP after the hurricane in the year, with negative growth of 2.7 percent compared to previous year. Estimated 6.8% fall in growth of GDP for 1999. | Increase in fiscal deficit to 3.6% of GDP and increase to 8.7% forecast for 1999, caused by hurricane. | Increase in current account imbalance to 8% of GDP caused by the damage, a similar level is forecast for 1999. | Total damage estimated at 3.793 billion dollars. |

Source: ECLAC, based on studies made on the ground in each case. See annex II, list of assessments made between 1972 and 1999.

# Annex II

## LIST OF ECLAC DOCUMENTS ON ESTIMATES OF THE SOCIO-ECONOMIC EFFECTS OF NATURAL DISASTERS

| | Title | English | Spanish |
|---|---|---|---|
| 1. | *Informe sobre los daños y repercusiones del terremoto de la ciudad de Managua en la economía Nicaragüense* (E/CN.12/AC.64/2/Rev.1), 13 January 1973 | | X |
| 2. | *Informe sobre los daños y repercusiones del huracán Fifí en la economía hondureña* (E/CEPAL/AC.67/2/Rev.1), 17 October 1974 | | X |
| 3. | *Evaluation of damage caused by the Grenada rainstorm and its implications for economic development programmes* (E/CEPAL/CDCC/9), 29 December 1975 | X | |
| 4. | *Informe sobre los daños causados en Antigua y Barbuda por el sismo del 8 de octubre de 1974 y sus repercusiones* (E/CEPAL/1001), 3 April 1975<br>*Report on the damage caused in Antigua and Barbuda by the earthquake of 8 October 1974 and its repercussions* (E/CEPAL/1001), 10 April 1975 | X | X |
| 5. | *Daños causados por el terremoto de Guatemala y sus repercusiones sobre el desarrollo económico y social de país* (CEPAL/MEX/76/Guat.1), February 1976 | | X |
| 6. | *Report on the effect of hurricane "David" on the island of Dominica (Note by the Secretariat)* (E/CEPAL/G.1099), 16 October 1979 | X | |
| 7. | *República Dominicana: Repercusiones de los huracanes David y Federico sobre la economía y las condiciones sociales (Nota de la Secretaría)* (E/CEPAL/G.1098/Rev.1), October 1979<br>*Dominican Republic: Effects of hurricanes David and Frederick on the economy and social conditions (Note by the Secretariat)* (E/CEPAL/G.1098/Rev.1), October 1979 | X | X |
| 8. | *Nicaragua: Las inundaciones de mayo de 1982 y sus repercusiones sobre el desarrollo económico y social del país* (E/CEPAL/G.1206), 2 July 1982 | | X |

| | Title | English | Spanish |
|---|---|---|---|
| 9. | *El Salvador: Los desastres naturales de 1982 y sus repercusiones sobre el desarrollo económico y social* (E/CEPAL/MEX/1982/L.30), 19 November 1982<br>*El Salvador: The natural disasters of 1982 and their effects on economic and social development* (E/CEPAL/MEX/1982/L.30), 3 February 1983 | X | X |
| 10. | *Guatemala: Repercusiones de los fenómenos meteorológicos ocurridos en 1982 sobre la situación económica del país* (E/CEPAL/MEX/1982/L.31), 24 November 1982 | | X |
| 11. | *Repercusiones de los fenómenos meteorológicos de 1982 sobre el desarrollo económico y social de Nicaragua* (E/CEPAL/MEX/1983/L.1), 5 January 1983 | | X |
| 12. | *Ecuador: Evaluación de los efectos de las inundaciones de 1982/1983 sobre el desarrollo económico y social* (E/CEPAL/G.1240), 9 May 1983 | | X |
| 13. | *Los desastres naturales de 1982-1983 en Bolivia, Ecuador y Perú* (E/CEPAL/G.1274), 27 December 1983<br>*The natural disasters of 1982-1983 in Bolivia, Ecuador and Peru* (E/CEPAL/G.1274), 26 January 1984 | X | X |
| 14. | *Daños causados por el movimiento telúrico en México y sus repercusiones sobre la economía del país* (LC/G.1367), 15 October 1985<br>*Damage caused by the Mexican earthquake and its repercussions upon the country's economy* (LC/G.1367), 23 October 1985 | X | X |
| 15. | *Report on the natural disaster caused by the Nevado del Ruiz Volcano in Colombia –Background document* (SG/SM.1/2), 4 December 1985 | X | |
| 16. | *El terremoto de 1986 en San Salvador: Daños, repercusiones y ayuda requerida* (LC/MEX/L.39/Rev.1), 21 November 1986<br>*Perfiles de Proyectos* (LC/MEX/L.39/Add.1/Rev.1), 24 November 1986 | | X |

| | Title | English | Spanish |
|---|---|---|---|
| 17. | *El desastre natural de marzo de 1987 en el Ecuador y sus repercusiones sobre el desarrollo económico y social* (LC/G.1465), 22 April 1987<br>*The natural disaster of March 1987 in Ecuador and its impact on social and economic development* (LC/G.14765), 6 May 1987 | X | X |
| 18. | *Capacitación para la prevención de desastres naturales en América Latina* (LC/R.655), 9 June 1988 | | X |
| 19. | *Daños ocasionados por el huracán Joan en Nicaragua: Sus efectos sobre el desarrollo económico y las condiciones de vida, y requerimientos para la rehabilitación y reconstrucción (Nota de la Secretaría)* (LC/G.1544), 17 November 1988<br>*Perfiles de proyecto de rehabilitación y reconstrucción* (LC/G.1544/Add.1), 17 November 1988<br>*Damage caused by hurricane Joan in Nicaragua. Its effects on economic development and living conditions, and requirements for rehabilitation and reconstruction (Note by the Secretariat)* (only) (LC/G.1544,2), December 1988<br>*Damage caused by hurricane Joan in Nicaragua. Its effects on economic development and living conditions, and requirements for rehabilitation and reconstruction needs. Rehabilitation and reconstruction project outlines* (LC/G.1544/Add.1), 9 December 1988 | X | X |
| 20. | *Informe del Taller de expertos sobre el proyecto: prevención de desastres naturales en América Latina y el Caribe* (Santiago, 5 y 6 de septiembre de 1989) (LC/R.800), 22 September 1989 | | X |
| 21. | *Situación actual en materia de previsión de caudales e inundaciones en América Latina y el Caribe* (LC/R.777/Rev.1), 25 September 1989 | | X |
| 22. | *Propuesta para definir el alcance del proyecto de previsión de caudales e inundaciones en cuencas seleccionadas de América Latina y el Caribe* (LC/R.779/Rev.1), 26 September 1989 | | X |
| 23. | *Efectos económicos de la erupción del volcán Cerro Negro en Nicaragua* (LC/L.686/Rev.1), 20 May 1992 | | X |

| | Title | English | Spanish |
|---|---|---|---|
| 24. | *El maremoto de septiembre de 1992 en Nicaragua y sus efectos sobre el desarrollo* (LC/L.708), 24 September 1992<br>*The Tsunami of September 1992 in Nicaragua and its effects on development* (LC/L.708), 20 October 1992 | X | X |
| 25. | *The impacts of natural disasters on developing economies: Implications for the international development and disaster community* – Internal circulation (INT.05-94), 27 September 1994 | X | |
| 26. | *Impacto económico de los desastres naturales en la infraestructura de salud* (LC/MEX/L.291), 8 January 1996<br>*The economic impact of natural disasters on health infraestructure* (LC/MEX/L.291), 12 January1996 | X | X |
| 27. | *Los efectos macroeconómicos y las necesidades de reconstrucción de la isla de Anguila después del huracán Luis* (LC/MEX/L.289), 26 January 1996<br>*The macro-economic effects and reconstruction requirements following hurricane Luis in the island of Anguilla* (LC/MEX/L.289), 5 December 1995 | X | X |
| 28. | *Los efectos macroeconómicos y las necesidades de reconstrucción en Sint Maarten, Antillas Neerlandesas, después de los huracanes Luis y Marilyn* (LC/MEX/L.290), 30 January 1996<br>*The macro-economic effects and reconstruction requirements following hurricanes Luis and Marilyn in Sint Maarten, Netherlands Antilles* (LC/MEX/L.290), 6 December 1995 | X | X |
| 29. | *Efectos de los daños ocasionados por el huracán César sobre el desarrollo de Costa Rica en 1996* (LC/MEX/L.312), 27 September 1996<br>*Effects of the damage by hurricane Cesar on the development of Costa Rica in 1996* (LC/MEX/L.312), 23 October 1996 | X | X |
| 30. | *Los efectos del huracán César sobre el desarrollo de Nicaragua en 1996* (LC/MEX/L.316), 15 October 1996<br>*Economic and social impact of hurricane Cesar on the development of Nicaragua in 1996* (LC/MEX/R.570), 23 September 1996 | X | X |

| | Title | English | Spanish |
|---|---|---|---|
| 31. | *El fenómeno El Niño: Su naturaleza y los riesgos asociados a su presencia recurrente* (LC/MEX/R.641), 28 January 1998 | | X |
| 32. | *Análisis costo-efectividad en la mitigación de daños de desastres naturales sobre la infraestructura social* (LC/MEX/R.643), 16 March 1998 | | X |
| 33. | *Ecuador: Evaluación de los efectos socioeconómicos del fenómeno El Niño en 1997-1998* (LC/R.1822/Rev.1) (LC/MEX/R.657/Rev.1), 16 July 1998<br>*Perfiles de Proyectos* (LC/R.1822/Add.1) (LC/MEX/R.657/Add.1), 16 July 1998 | | X |
| 34. | *El fenómeno El Niño en Costa Rica durante 1997-1998. Evaluación de su impacto y necesidades de rehabilitación, mitigación y prevención ante las alteraciones climáticas* (LC/MEX/L.363), 3 November 1998<br>*Perfiles de proyectos* (LC/MEX/L.363/Add.1), 3 November 1998 | | X |
| 35. | *República Dominicana: Evaluación de los daños ocasionados por el huracán Georges, 1998. Sus implicaciones para el desarrollo del país* (LC/MEX/L.365), 4 December 1998<br>*Perfiles de proyectos* (LC/MEX/L.365/Add.1), 4 December 1998 | | X |
| 36. | *Report of The Joint ECLAC/ECCB Mission to Assess the Macroeconomic Effects and the Reconstruction Requirements Arising from The Impact of Hurricane Georges on Saint Kitts and Nevis (Incorporating Social and Environmental Aspects),* General, 22 December 1998 | X | |
| 37. | *Honduras: Evaluación de los daños ocasionados por el huracán Mitch, 1998. Sus implicaciones para el desarrollo económico y social y el medio ambiente* (LC/MEX/L.367), 26 January 1999<br>*Honduras: Assessment of the damage caused by hurricane Mitch, 1998. Implications for economic and social development and for the environment* (LC/MEX/L.367), 14 April 1999 | X | X |

| | Title | English | Spanish |
|---|---|---|---|
| 38. | *Guatemala: Evaluación de los daños ocasionados por el huracán Mitch, 1998. Sus implicaciones para el desarrollo económico y social y el medio ambiente* (LC/MEX/L.370), 4 February 1999<br>*Guatemala: Assessment of the damage caused by hurricane Mitch, 1998. Implications for economic and social development and for the environment* (LC/MEX/L.370), 23 April 1999 | X | X |
| 39. | *Efectos macroeconómicos del fenómeno El Niño de 1997-1998. Su impacto en las economías andinas* (LC/MEX/R.688), 8 February 1999 | | X |
| 40. | *El Salvador: Evaluación de los daños ocasionados por el huracán Mitch, 1998. Sus implicaciones para el desarrollo económico y social y el medio ambiente* (LC/MEX/L.371), 15 February 1999<br>*El Salvador: Assessment of the damage caused by hurricane Mitch, 1998. Implications for economic and social development and for the environment* (LC/MEX/L.371), 21 April 1999 | X | X |
| 41. | Nicaragua: *Evaluación de los daños ocasionados por el huracán Mitch, 1998. Sus implicaciones para el desarrollo económico y social y el medio ambiente* (LC/MEX/L.372), 3 March 1999<br>*Nicaragua: Assessment of the damage caused by hurricane Mitch, 1998. Implications for economic and social development and for the environment* (LC/MEX/L.372), 19 April 1999 | X | X |
| 42. | Costa Rica: *Evaluación de los daños ocasionados por el huracán Mitch, 1998. Sus implicaciones para el desarrollo económico y social y el medio ambiente* (LC/MEX/L.373), 4 March 1999<br>*Costa Rica: Assessment of the damage caused by hurricane Mitch, 1998. Implications for economic and social development and for the environment* (LC/MEX/L.373), 26 April 1999 | X | X |

| | Title | English | Spanish |
|---|---|---|---|
| 43. | *Centroamérica: Evaluación de los daños ocasionados por el huracán Mitch, 1998. Sus implicaciones para el desarrollo económico y social y el medio ambiente* (LC/MEX/L.375), 18 May 1999<br>*Central America: Assessment of the damage caused by hurricane Mitch, 1998. Implications for economic and social development and for the environment* (LC/MEX/L.375), 21 May 1999 | X | X |
| 44. | *América Latina y el Caribe: El impacto de los desastres naturales en el desarrollo, 1972-1999* (LC/MEX/L.402), 29 September 1999 | | X |
| 45. | *El terremoto de enero de 1999 en Colombia: Impacto socioeconómico del desastre en la zona del Eje Cafetero* (LC/MEX/L.374), 27 April 1999 | | X |
| 46. | *Los efectos socioeconómicos de las inundaciones y deslizamientos en Venezuela en 1999* (LC/MEX/L.421), 14 February 2000 | | X |